

## Human v. Nonhuman Sources

What the 1994 Water Quality Standards Handbook said:

“States may apply bacteriological criteria sufficient to support primary contact recreation with a rebuttable presumption that the indicators show the presence of human fecal pollution. Rebuttal of this presumption, however, must be based on a sanitary survey that demonstrates a lack of contamination from human sources. The basis for this option is the absence of data demonstrating a relationship between high densities of bacteriological water quality indicators and increased risk of swimming-associated illness in animal-contaminated waters.”

What we say in the *Guidance*:

“EPA no longer believes that the position taken in the 1994 Water Quality Standards Handbook is supported by the available scientific data. The available data suggest that there is some risk posed to humans as a result of exposure to microorganisms resulting from non-human fecal contamination. As a result, states and authorized tribes may no longer use broad exemptions from the bacteriological criteria for waters designated for primary contact recreation based on the presumption that high levels of bacteria resulting from non-human fecal contamination present no risk to human health.

“Recent evidence indicates that warm-blooded animals other than humans may be responsible for transmitting pathogens capable of causing illness in humans. Examples include outbreaks of enterohemorrhagic *E. coli* O157:H7, *Salmonella*, *Giardia*, and *Cryptosporidium*, all of which are frequently of animal origin. Consequently, due to the potential for animal sources to contribute human pathogens to surface waters, EPA is changing its 1994 policy as stated in the Water Quality Standards Handbook through this guidance to recommend that states and authorized tribes apply their water quality criteria for bacteria to all waterbodies designated for primary contact recreation in order to ensure protection of human health from gastrointestinal illness. Livestock, wildlife, and domestic pets are carriers of human pathogens and can transmit these pathogens to surface waters as well as contribute significant numbers of indicator bacteria to waterbodies. The relative health risk from waters contaminated by human sources versus non-human sources has been the subject of recent debate, particularly related to the application and implementation of EPA’s recommended water quality criteria for bacteria. Blanket exemptions for animal sources would not ensure protection of swimmers in waters designated for primary contact recreation.

“Incidents where these pathogens have been spread to humans through water have been documented in recent years. In the case of *E. coli* O157:H7, several cases have been cited in which fecal contamination from animals was the probable source of the pathogen. The most prominent examples have included contamination of water supplies, including an outbreak in Alpine, Wyoming, in June 1998, affecting 157 people, and a major outbreak Walkerton, Ontario, in May and June of 2000 causing more than 2,300 people to become ill and causing seven deaths (CDC, 2002; CDC, 2000; Ontario’s Ministry of the Attorney General, 2000). In the former case, contamination by wildlife of the community water supply is the suspected source, and in Walkerton, Ontario, heavy rains causing agricultural runoff to leak into city wells is suspected. The 1993 Milwaukee *Cryptosporidium* outbreak is a well-known example of water supply contamination that resulted in 403,000 illnesses and approximately 100 deaths. The source of the oocysts was not identified, but suspected sources include agricultural runoff from dairies in the region, wastewater from a slaughterhouse and meat packing plant, and municipal wastewater treatment plant effluent (Casman, 1996; USDA, 1993). In addition, *Cryptosporidium* was the known cause of 15 other outbreaks associated with drinking and recreational water affecting 5,040 individuals in the U.S. between 1991 and 1994 (Gibson et al., 1998). While many of the reported outbreaks have occurred through the consumption of contaminated drinking water, other incidences of *E. coli* O157:H7 infection from exposure to surface waters have been documented. For example, in the summer of 1991, 21 *E. coli* O157:H7 infections were traced to fecal contamination of a lake where people swam in Portland, Oregon (Keene et al., 1994)

“These and other pathogens can cause significant gastrointestinal illness, although direct measurement of these organisms is not readily quantified by current conventional microbial methods. While EPA believes that non-

human sources are capable of transmitting pathogens that can cause the specific kinds of gastrointestinal illness identified in EPA's original epidemiological studies, the specific risk from these sources has not been fully determined. The risk presented by fecal contamination of waters by non-human sources is possibly less significant; however, the increasing number of cases described above in which animals are the likely cause of the contamination and resulting illness present a compelling case to protect waters where human contact or consumption are likely to occur. In addition, because the presence of bacterial indicators may provide evidence of fecal pollution, high levels of these indicator organisms originating from animal sources may also indicate the presence of pathogens capable of causing other human illnesses in addition to acute gastroenteritis.

"A study conducted by Calderon et al. (1991) sought to determine if the human health risk from animal sources could be quantified. The study was conducted on a small, three-acre pond in a semi-rural community in central Connecticut and examined the relationship between water quality degraded by dispersed, unidentified sources of animal fecal contamination and swimmer illness. It found that although large numbers of indicator organisms were contributed to the waterbody by animals, the resulting health risk was statistically insignificant at the 95% confidence interval to swimmers. This study concluded that EPA's currently recommended bacterial indicators are ineffective for predicting potential health effects associated with water contaminated by animal sources of fecal pollution.

"Because of the relatively small sample size and the closeness of the statistical analyses to demonstrating that a relationship existed between enterococci concentrations and swimmer illness, EPA believes that this single study does not provide an adequate basis to conclude that non-human sources of fecal contamination have no potential to cause gastrointestinal illness in humans. (That is, the study p-value was 0.059 when analyzing the correlation between enterococci and swimmer illness. A p-value less than 0.05 would have indicated a strong relationship between the two parameters.)

"Unless and until the time that the absence of a relationship between non-human sources of fecal contamination and human illness rates is established, EPA recommends that states and authorized tribes apply their water quality criteria for bacteria to all waterbodies designated with primary contact recreation in order to ensure protection of human health from gastrointestinal illness, and thus is changing its policy regarding non-human sources of fecal contamination from what was previously contained in the 1994 *Water Quality Standards Handbook* on this issue.

"While EPA believes a change in this policy is necessary to ensure protection of human health, EPA acknowledges such a change may present states and authorized tribes with difficulties, such as the routine exceedance of the ambient water quality criterion due to natural sources of pollution. Changes to the designated use may be the most appropriate way to address these situations. Examples of natural (and potentially uncontrollable) sources are resident wildlife populations, migrating waterfowl, wildlife refuges, or lakes frequented by waterfowl. For waterbodies affected by natural sources such as these, where a significant portion of fecal contamination is shown to be from natural sources and a state or authorized tribe demonstrates the water quality criterion for bacteria and the primary contact recreation designated use is not attainable through the control of other sources, an intermittent, wildlife impacted, or secondary contact recreational use may be the most appropriate designated use. Section 4.4.2 discusses the process a state or authorized tribe would follow to refine recreational uses where contamination from natural sources is significant."

What commenters said about the *Guidance* language:

Kerianne Gardner, Region 10 - "We greatly appreciate the change in policy... reflecting recognition of the potential effects of nonhuman sources of fecal contamination. While this is a necessary and desirable change to protect human health, it is a significant change in practice to move from allowing non-human sources to be considered "natural," and potentially exempt the criteria from applying when bacteriological indicators are found to be of animal origin, to recommending states and authorized tribes apply water quality criteria for bacteria to all waterbodies designated with primary contact recreation. It is very important for this new policy direction to be communicated to the many people who administer Water Quality Standards programs and use the 1994 handbook."

Stan Martinson, California - “We fully support your proposed revision of the 1994 policy, which is referred to in the [Guidance]. The 1994 policy allowed states and authorized tribes to exclude water bodies from compliance with standards when bacterial indicators were found to be of animal origin. Your proposed revision does not allow this exclusion. Because non-human fecal sources cannot be ruled out in all human illness outbreaks, this change is warranted.”

Robert Smith, Connecticut - “... EPA’s proposed decision to rescind the 1994 policy... is inconsistent with standard public health practice. Requiring states to perform UAA’s to establish “wildlife impacted” use designations in these situations places an unnecessary burden on state’s ability to make effective use of resources.”

Cynthia Giles, Massachusetts - “While EPA recommends using the proposed bacteria criteria for areas affected by livestock and wildlife, better information on health risks to humans is needed. The Calderon study cited does not determine whether the indicator bacteria were derived from humans or wildlife, so even this limited effort is not particularly useful in this regard. Therefore, EPA should conduct further epidemiological studies to help clarify the public health risks to humans from animal wastes.”

Megan White, Washington - “We strongly support the reversal of the [1994 Handbook] exemption for animal waste. We do take exception, however, to allowing water contact recreation to be removed as a beneficial use just because wildlife is causing the violation. It is more appropriate that alternative criteria be developed based on the natural source concentrations, or even just a note in the standards recognizing exceedence due to wildlife, and then including a narrative standard requiring that human sources not be allowed to cause or contribute further bacterial waste. We do not want the ability to acknowledge wildlife sources to be used as a mechanism to allow increased human contamination. Further, whether or not a state designates recreation in its standards, people tend to recreate in the same areas as wildlife. The potential to allow more human contamination because of existing high loads from animals should be formally eliminated in the guidance.”

Alan Pollock, Virginia - “EPA should recognize the difference in risk between animal contamination and human contamination. The 1994 policy... is reasonable and should be returned. These criteria were developed at beaches contaminated by human waste. They are not applicable to water contaminated by other animals. Even if these criteria are adopted, the rare outbreaks of disease due to animal contamination will still occur (because we cannot control wildlife or livestock bacterial input in a regulatory framework). Furthermore, the examples of illness due to animal contamination that was provided in section 4.2 were from drinking water supplies. The risk of contacting a disease by drinking approximately 2 liters of waters per day is much higher than swimming in water with the same animal contamination. If the goal is to rid waters of livestock manure, then the proper studies for the risk to human health should be undertaken.”

Ron Klein, Alaska - “This policy change would create significant problems for Alaska. Alaska Water quality standards state: “The water quality standards set by this chapter specify the degree of degradation that may not be exceeded in a waterbody as a result of human actions.” The changed EPA policy contradicts Alaska’s standards, in that it introduces wildlife contributions of fecal material, which are not a result of human actions, as a source of degradation and potential violation of water quality standards. Since Alaska’s standards by default protect all waters for all uses, the primary contact recreation use and standards apply to virtually every water body in the state.”

Marvin Hora, Minnesota - “[Minnesota] supports the shift in EPA policy regarding the potential human health risk of exposure to water contaminated with fecal bacteria from non-human sources. We believe that a substantial portion of the fecal contamination measured in Minnesota rivers and streams is from animal sources. However, if this is the case, it may complicate the prediction of risk to humans exposed to fecal contamination, and affect our ability to set a specific target level of protection with any degree of confidence. Is it not true that the epidemiological studies EPA used to arrive at (and re-confirm) the E. coli criterion involved sources of fecal contamination known to be of human origin?”

Kent Carlson, Maryland - “Discouraging the distinction of anthropogenically caused fecal contamination from that of wildlife is inappropriate for this venue (under Clean Water Act...) And ultimately impractical. Additionally, this

statement places an immense burden on the receiving parties to create site-specific criteria, variances, or changes in their designated uses to accommodate naturally occurring populations of animals. Guidance or commentary based on the combination of all forms of fecal contamination could be more appropriately addressed under [SDWA and MCLs].”

J. Ray Patton, California State Parks - “Last year... using the Enterolert method of testing, we obtained suspect data. The Enterococcus numbers were extremely high with no indication of a likely source of that magnitude of contamination. The Enterococcus numbers did not generally relate to *E. coli*, fecal coliforms or total coliforms. Additionally, there is concern in some circles that algae could have possibly interfered with the Enterolert test results.”

Robert Sakata, Colorado - “[T]he Commission appreciates the fact that EPA has taken additional steps to recognize the complexity of the non-human sources issue by including a discussion of “wildlife-impacted recreation uses” in the new draft. However, the Commission is concerned that EPA’s revised approach to this issue still ignores the complexities of the real world by apparently tying the “wildlife-impacted recreation use” option to instances where “it can be demonstrated that primary contact recreation is not an existing use.

“If water quality in a particular water body has been and continues to be impacted by wildlife sources, then even if primary contact recreation use has occurred in that water body, the use that has occurred is a “wildlife-impacted recreation use” and this refined use designation should be appropriate. Otherwise, EPA still has provided no realistic alternative for addressing, e.g., the circumstances where primary contact recreation use may have occurred in a pond or lake in a wildlife refuge at some time since 1975. This is precisely the type of circumstance where adoption of a “wildlife-impacted recreation use” designation, along with numerical criteria that reflect the wildlife impact, may be the most appropriate. As EPA notes in the draft guidance, it may be appropriate to communicate to the public the risk associated with recreating in these waters. However, if the only option is adopting a primary contact use designation with EPA’s usual numerical criteria for these waters, a serious dilemma is posed. For example, would such a result mean that a TMDL would have to be developed in an effort to attain EPA’s numerical criteria for bacteria? If so, is it appropriate (or even legally permissible to undertake efforts to keep migratory waterfowl off ponds or lakes in wildlife refuges in order to attain water quality standards?”

Jacqueline Savitz, Oceana - “[W]e also encourage EPA not to differentiate between human and non-human sources of contamination until scientific results show conclusively that non-human sources do not pose a threat to public health... Changing the designated use of a receiving waterbody should not be used as a way to avoid dealing with the cause of fecal contamination. This is particularly inappropriate when there is a heavy anthropogenic influence on the wildlife source such as is the case with geese on golf courses... Allowing an easy “out” by changing the designated use of the receiving water will not provide the necessary incentives to stem the source of the contamination nor will it ensure that available options are exercised to restore the water to its designated use.

“While EPA acknowledges that water contamination resulting from non-human causes can still cause human illnesses, the suggestion to designate a wildlife-impacted recreational use implies allowing a greater degree of contamination, which is not scientifically justified.”

Mitzy Taggart, Heal the Bay - “Heal the Bay supports [EPA’s] policy to not allow exemptions from bacteriological criteria for waters designated for primary contact recreation due to high levels of bacteria indicators from animal sources.”

Marolyn Parson, National Association of Home Builders - “NAHB questions EPA’s policy change regarding high levels of indicator organisms from animal sources, and the solution it offers for the difficulties states will face by the routine exceedance of the ambient water quality criterion due to natural sources of bacterial pollution... NAHB... questions the appropriateness of changing a policy based on contamination of water supplies from animal feces when the criteria in question is addressing recreational uses not water supply uses.”

Richard Newpher, American Farm Bureau Federation - "Farmers and ranchers are sensitive that regardless of the bacteria source, agriculture will be blamed for the problem. We believe the agency should consider other alternatives for managing the risks associated with bacteria before making this proposed change.

"There is little or no evidence to indicate that EPA's 1994 bacteria policy is wrong. Therefore states and tribes should be allowed to justify a decision not to apply bacterial criteria to a particular waterbody when bacteria indicators are found to be of animal origin."

Robert Lee, National Cattlemen's Beef Association - "Because waters are different, NCBA submits that a "one size fits all" approach is not appropriate in any water quality criteria determination. All waters are not primary contact waters. As such, it is not appropriate to apply more stringent standards to waters that are not primary contact waters. To do otherwise could impose significant costs on many operation that are small businesses."

Robert Nuzzi, Suffolk County (NY) - "[I]t is not inappropriate to consider the possibility that non-human sources of fecal contamination may pose *less* of a risk than human sources. If so, then the standards promulgated by EPA may very well be overly conservative in instances where human sources are absent... In other words, it is just inappropriate to conclude that non-human sources of fecal contamination present a risk equal to that of human sources."

Chris Crompton, Orange County (CA) - "EPA's policy regarding fecal contamination of animal origin needs further refinement... We agree that there is some risk posed to humans as a result of exposure to microorganisms resulting from non-human fecal contamination, and high levels of indicator organisms originating from animal sources may also indicate the presence of pathogens. However, extrapolation of the water quality criteria which were based primarily on human contamination, to animal based contamination is unjustified and without technical basis. EPA has made a significant change in policy that could result in numerous waterbody 303(d) listings and no commensurate public health benefit. Where has EPA provided he technical basis as well as the economic analysis used to support this change in policy?"

Robert Shanks, Sacramento Regional County Sanitation District - "The District agrees and otherwise supports a number of provisions, including... [n]on-human fecal contamination presents a health risk and should no longer serve as a basis for broad exemptions from application of bacteria criteria."

Barbara Biggs, Metro Wastewater Reclamation District - "The draft guidance is a reasonable start to the discussion of nonhuman sources, but it does not go far enough. The Metro District recognizes that the requirement that all waters be "fishable and swimmable" is a Clean Water Act goal. However... listing water bodies impaired by nonhuman sources will only result in wasted efforts to develop TMDLs that cannot be implemented due to a variety of issues."